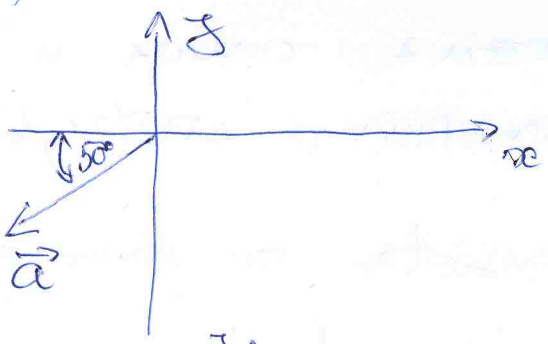
Pismeni zadatak iz fizike

Grupa I g Učenik _____

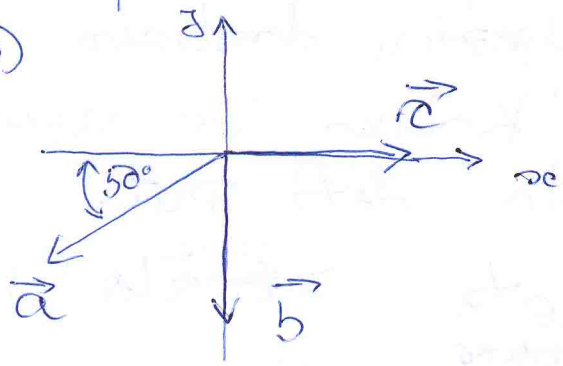
1. a) Razložiti vektor $\vec{a}$ na komponente duž x, y ose



$a=4$; $\sin 50° = 0{,}766$

$\cos 50° = 0{,}643$

b)



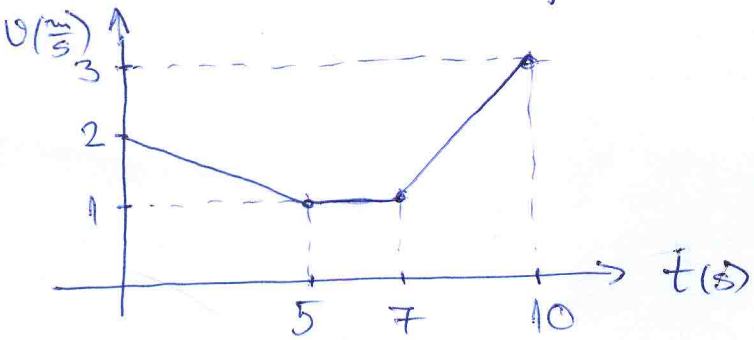
Sabrati vektore

$a=4$

$b=3$

$c=5$

2. Na osnovu datog grafika $v(t)$ nacrtati grafik $a(t)$ i naći predeni put u toku prvih 10s kretanja.



3. Čamac se kreće nizvodno od mjesta A do mjesta B na istoj obali rijeke. Rastojanje između A i B je 10km, i čamac ga pređe za 1h. Brzina čamca u odnosu na vodu je 4 $\frac{km}{h}$. Stigavši do B čamac se okreće i vraća nazad u A.

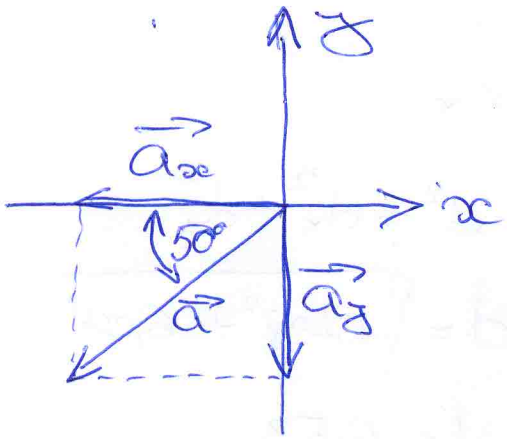
a) Kolika je brzina rijeke?

b) Koliko je vrijeme potrebno da pređe iz B u A?

c) Kolika je srednja brzina čamca u odnosu na obalu za svo vrijeme kretanja.

4. Počavši iz mirovanja raketa se kreće sa ubrzanjem $40 \frac{m}{s^2}$. Kolika brzinu dostigne poslije pređenih 100km? Koliko je vremena trebalo raketi da pređe dati put? Kolika put je raketa prešla u posljednjoj sekundi posmatranog kretanja?

1.



$a = 4$

$\sin 50° = \frac{a_y}{a}$

$a_y = a \sin 50°$

$a_y = 4 \sin 50°$

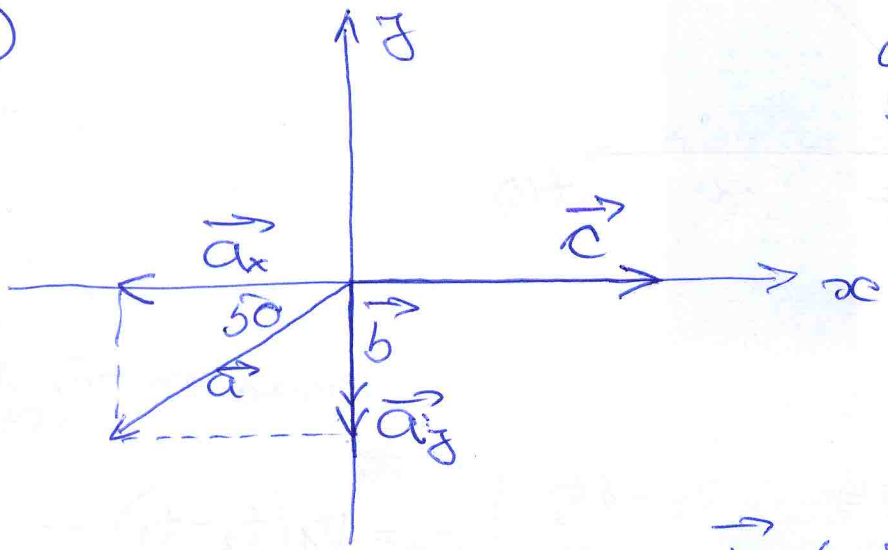
$a_y = 3{,}064$

$\cos 50° = \frac{a_x}{a}$

$a_x = a \cos 50°$

$a_x = 4 \cdot 0{,}643 = 2{,}572$

b)



$a = 4$

$b = 3$

$c = 5$

① $\vec{d_x} = \vec{a_x} + \vec{c}$

② $\vec{d_y} = \vec{a_y} + \vec{b}$

$\vec{d_x} = \vec{a_x} + \vec{c}$

$d_x = c - a_x$

$d_x = 2{,}428$

PRAVAC i SMJER VEKTORA $\vec{c}$

$\vec{d} = \vec{d_y} + \vec{d_x}$

$\vec{d} = \vec{a} + \vec{b} + \vec{c}$

$\vec{a} = \vec{a_x} + \vec{a_y}$

$\vec{d} = (\vec{a_x} + \vec{c}) + (\vec{a_y} + \vec{b})$

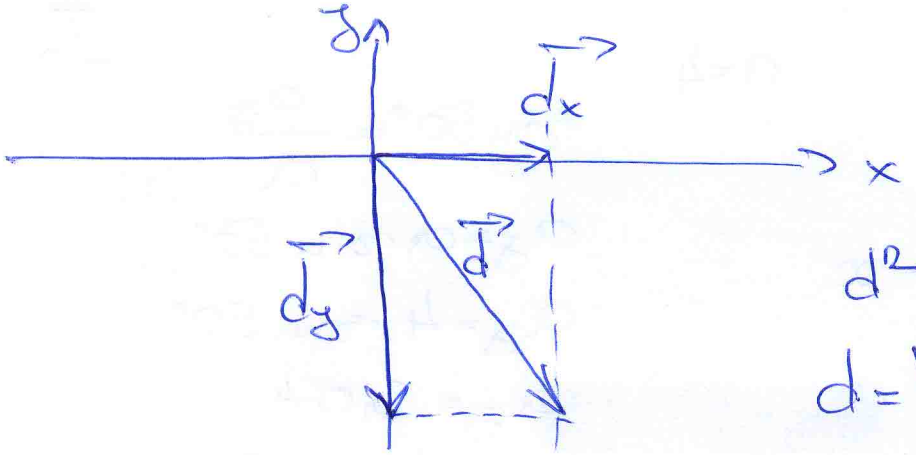
$\vec{d} = \vec{d_x} + \vec{d_y}$

$\vec{d_y} = \vec{a_y} + \vec{b}$

$d_y = a_y + b$

$d_y = 6{,}064$

PRAVAC i SMJER vektora $\vec{a_y}, \vec{b}$

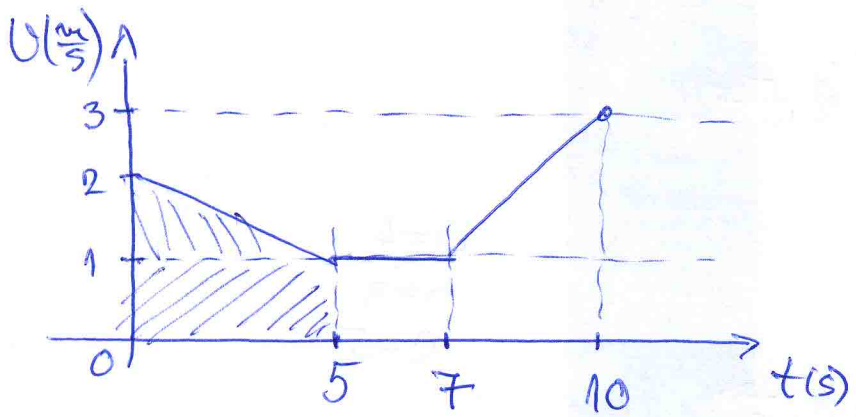


$$d^2 = d_x^2 + d_y^2$$

$$d = \sqrt{2{,}428^2 + 6{,}064^2}$$

$$d = 6{,}53$$

2.



$a(t) = ?$

$s_u = ?$

PREKO POVRSI ISPOD GRAFIKA

I kretanje

$v_{o1} = 2\frac{m}{s}$

$v_1 = 1\frac{m}{s}$

$t_1 = \Delta t = 5s - 0s = 5s$

$$a = \frac{v - v_o}{t}$$

$$a_1 = \frac{v_1 - v_{o1}}{t_1}$$

$$a_1 = \frac{1\frac{m}{s} - 2\frac{m}{s}}{5s}$$

$$a_1 = -0{,}2\frac{m}{s^2}$$

$v_1 = 2\frac{m}{s}$ $\quad$ $v_2 = 1\frac{m}{s}$

$t_1 = 0s$ $\quad$ $t_2 = 5s$

$$a = \frac{v_2 - v_1}{t_2 - t_1}$$

$$a_1 = \frac{1\frac{m}{s} - 2\frac{m}{s}}{5s - 0s}$$

$$a_1 = -0{,}2\frac{m}{s^2}$$

kretanje se ravnomerno usporeno

$$s_1 = v_1(t_2 - t_1) - \frac{(v_1 - v_2)(t_2 - t_1)}{2}$$

$$s_1 = 2\frac{m}{s} \cdot 5s - \frac{1\frac{m}{s} \cdot 5s}{2}$$

$$s_1 = 7{,}5m$$

ili

$$s_1 = v_{o1}t_1 - \frac{|a_1|t_1^2}{2}$$

$$s_1 = 2\frac{m}{s} \cdot 5s - \frac{0{,}2\frac{m}{s^2} \cdot (5s)^2}{2}$$

$$s_1 = 10m - 2{,}5m$$

$$s_1 = 7{,}5m$$

II kretanje

$v = 1\frac{m}{s}$; $v = const \Rightarrow \Delta v = 0 \Rightarrow a = \frac{\Delta v}{\Delta t} = 0\frac{m}{s^2}$

$a_2 = 0\frac{m}{s^2}$ $\quad v = \frac{s}{t} \Rightarrow s_2 = v_2 \cdot t_2$

$t_2 = \Delta t = 7s - 5s = 2s$

$\boxed{s_2 = 2m}$

III kretanje

$v_1 = 1\frac{m}{s}$ $\quad v_2 = 3\frac{m}{s}$

$t_1 = 7s$ $\quad t_2 = 10s$

$$a_3 = \frac{v_2 - v_1}{t_2 - t_1}$$

$$a_3 = \frac{3\frac{m}{s} - 1\frac{m}{s}}{10s - 7s}$$

$$a_3 = \frac{2}{3}\frac{m}{s^2}$$

$\Delta t = t_2 - t_1 = 3s$

$t = \Delta t = 3s$

$v_0 = v_1 = 1\frac{m}{s}$

$v = v_2 = 3\frac{m}{s}$

$$s_3 = v_0 t + \frac{a t^2}{2}$$

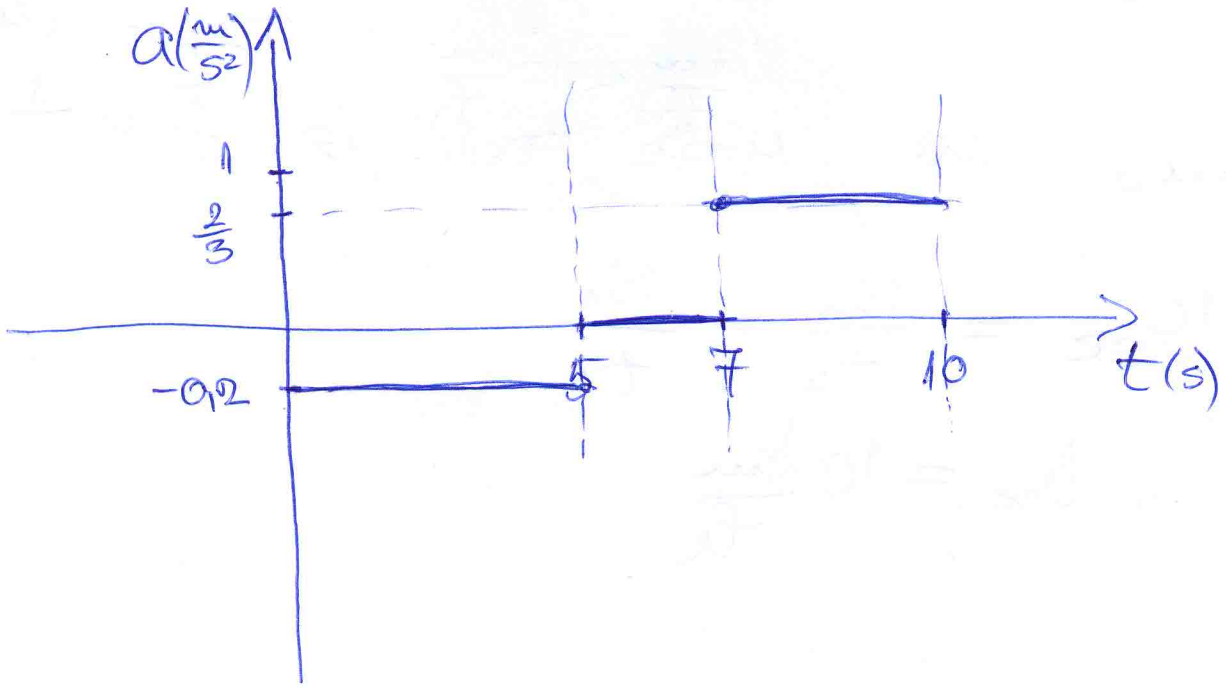
$$s_3 = 1\frac{m}{s} \cdot 3s + \frac{\frac{2}{3}\frac{m}{s^2}(3s)^2}{2}$$

$s_3 = 3m + 3m$

$s_3 = 6m$

Probajte odrediti pređeni put preko površi ispod ~~grafika~~.

$s_u = s_1 + s_2 + s_3 \Rightarrow s_u = 15{,}5m$



3. $s = 10\,km$

$t_1 = 1\,h$

$v' = 4\,\frac{km}{h}$

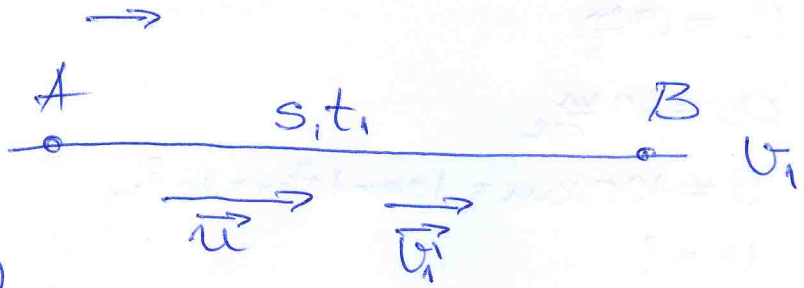
$u = ?$

$t_2 = ?$

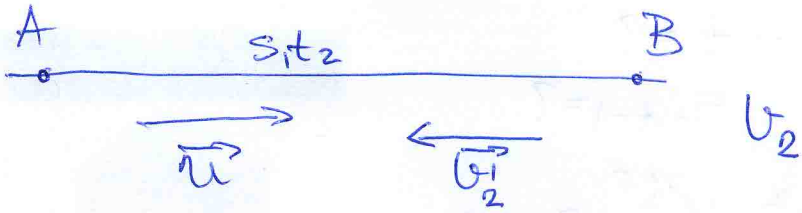
$v_{sr} = ?$

$v_1' = v_2' = v'$

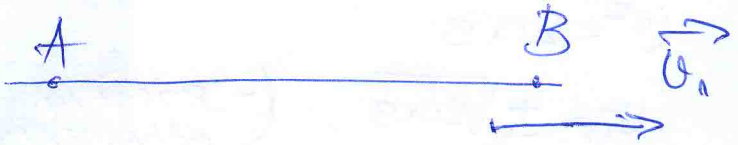
a)



b)



a) $\vec{v} = \vec{v'} + \vec{u}$



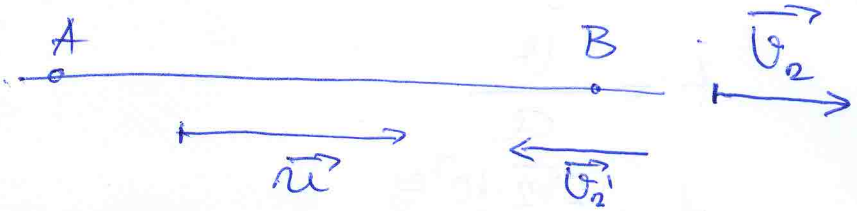
$\vec{v_1} = \vec{v_1'} + \vec{u}$

$v_1 = v_1' + u = v' + u$

$v_1 = \frac{s}{t_1} \Rightarrow \frac{s}{t_1} = v' + u \Rightarrow u = \frac{s}{t_1} - v'$

$u = \frac{10\,km}{1\,h} - 4\,\frac{km}{h} = 6\,\frac{km}{h}$; $u = 6\,\frac{km}{h}$

b) $\vec{v_2} = \vec{v_2'} + \vec{u}$



$v_2 = u - v'$

v_2 SMJER vektora $\vec{u}$

(BRZINA RIJEKE JE VEĆA OD BRZINE ČAMCA TAKO DA ČAMAC NE MOŽE PREĆI IZ B U A).

$v_{sr} = \frac{s_u}{t_u} = \frac{s_1}{t_1}$

$v_{sr} = 10\,\frac{km}{h}$

1. $v_0 = 0 \frac{m}{s}$

$a = 40 \frac{m}{s^2}$

$s = 100 km = 100 \cdot 10^3 m = 10^5 m$

$v = ?$

$t = ?$

$s_{t,t-1} = ?$

$v^2 = \cancel{v_0^2}^{0} + 2as$

$v^2 = 2as$

$v_{1,2} = \pm\sqrt{2as}$ ("-" не се земе одвисно)

$v = \sqrt{2as}$

$v = \sqrt{2 \cdot 10^5 m \cdot 4 \cdot 10^1 \frac{m}{s^2}} = \sqrt{2 \cdot 4 \cdot 10^6 \frac{m^2}{s^2}}$

$v = 2\sqrt{2} \cdot 10^3 \frac{m}{s} = 2828 \frac{m}{s}$

$a = \frac{v - \cancel{v_0}^{0}}{t} = \frac{v}{t}$

$t = \frac{v}{a}$

$t = \frac{2\sqrt{2} \cdot 10^3 \frac{m}{s}}{4 \cdot 10^1 \frac{m}{s^2}}$

$t = \frac{\sqrt{2}}{2} \cdot 10^2 s = 70{,}7 s$

$s_{t,t-1} = s_t - s_{t-1}$

$s_t = 100 km = 10^5 m$

$s_{t-1} = \cancel{v_0}^{0}(t - 1s) + \frac{a(t-1s)^2}{2}$

$s_{t-1} = \frac{a(t-1s)^2}{2}$

$s_{t-1} = \frac{40 \frac{m}{s^2} (69{,}7 s)^2}{2}$

$s_{t-1} = 97162 m$

$s_{t,t-1} = 100000 m - 97162 m$

$s_{t,t-1} = 2838 m$